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PORTABLE BIONSOR FOR VIRUS DETECTION

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A portable biosensor that can be used for quantitative detection of an antigen in an aqueous solution was developed. Yellow-green (505 nm excitation/515 nm emission) FluoSpheres (fluorescent microspheres) were coated with anti Human-IgG antibody, and subsequently excited with a light emitting diode (LED) with a wavelength range of 490 – 520 (maximum excitation wavelength at 505 nm). The light from the LED was isolated with band-pass filters so that only wavelengths shorter than 510 nm reached the anti-IgG coated microspheres. A silicon photodiode detector was used to detect the fluorescence intensity of the anti-IgG coated microspheres. Additional bandpass filters that allowed only wavelengths of light longer than 515 nm to pass were used in front of the silicon photodiode detector; this ensured that only light due to the fluorescence of the microspheres, and not scattered light from the LED, was detected. The fluorescence intensity was proportional to the anti-IgG coated microsphere concentration in the buffer. The fluorescence emitted from the anti-IgG coated microspheres was determined at various conditions and solution conditions were optimized. The anti-IgG coated microspheres at 5.7 E 5 beads / ml concentration in an aqueous phosphate buffer solution (pH 6.4) was demonstrated to show a strong fluorescence. When an antigen such as IgG is bound to anti-IgG coated microspheres, the fluorescence intensity will change due to the change of the fluorophore environment; this change provides a mode of sensing and quantitatively detecting antigen presence. The antigen used in this study was Human IgG. A detection limit study to discover the lowest IgG concentration that can be detected by using this biosensor will be performed in the next stage of this experiment. In addition, other antigens will also be tested to discover how many antigens can be detected by using this portable biosensor. The long-term goal of this project is to develop a portable biosensor that can be used to detect the presence of a variety of viruses.